

Application No.: 10/040,917

Attorney Docket No.: 59589.000040

REMARKS

Claims 1-15, 17-20, 22, 23 and 25-42 are pending in this application. Claims 32 -37 have been withdrawn from consideration.

By this Amendment, claims 1-15, 17-20, 22, 23, 25-31 and 38-41 are amended, claim 42 is added, and claims 16, 21 and 24 are canceled without prejudice or disclaimer to the subject matter set forth therein. Applicants have amended the claims to more particularly point out various features of the present invention.

No new matter is presented by the Amendment. Support for the amendments may be found, for example, in now canceled claims 16 and 21, and paragraphs 46-50 and 61.

Applicants respectfully request reconsideration of the application.

A. The 35 U.S.C. § 112, Second Paragraph Rejection

The Office Action rejects claims 1-31 and 38-41 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regard as the invention.

The Office Action asserts various deficiencies with the claims. In response, the claims have been amended to overcome the asserted deficiencies. It is respectfully submitted that the claims now satisfy all requirements of 35 U.S.C. §112.

B. 35 U.S.C. § 102(b) Rejections

In the Office Action, claims 1-10, 15-18, 20-27, 29, 30 and 38 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Reber (U.S. Patent No. 4,944,861) in view of Kimura et al. (Principles and Development of a Thick-Film Zirconium Oxide Oxygen Sensor, pp. 101-120, from ACS Symposium Series 309, 1986). The Office Action notes that Kimura is being cited and relied on for the first time with this office action.

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The Office Action asserts that Reber sets forth all the limitations of the claims (see previous office action), but did not explicitly recite that the two electrodes have different associated time constants. The Office Action explains that for the purpose of examination, the Examiner will presume that a gas diffusion coefficient difference would read on the claimed time constant difference because a diffusion coefficient difference would change the amount of time two electrodes could respond to any concentration changes; and that this interpretation would appear to be supported by paragraph 0045 of the present invention where changes in the amount of porous material over each electrode is construed as being a time constant change. The Office Action then notes that it is notoriously old in the art to coat an electrode in an exhaust gas space with a protective layer to prevent premature failure of the electrodes, and that it is unnecessary to coat the reference electrode because it is not exposed to a harsh gas environment. The Office Action notes asserted teachings of Kimura.

The Office Action concludes that it would have been obvious to the one of ordinary skill for Reber to include a porous protective layer to the measuring electrode (as taught by Kimura) in order to avoid premature failure of the measuring electrode.

Applicant has carefully considered the Office Action and the Examiner's comments set forth therein. Claim 1 has been amended to recite, in particular, a gas sensor system for monitoring gas concentrations in flue gas generated by a combustor. Claim 1 recites that the gas sensor system comprises a gas sensor and further recites various specifics of the structure of the gas sensor, i.e., including an outer shell, a solid electrolyte cell, at least one seal, a first electrode and a second electrode, as well as the interrelationship therebetween. In conjunction with these features, claim 1 further recites a voltage being generated across the first and second electrodes representing at least two conditions, wherein the first electrode and the second electrode generate

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a signal comprised of a DC component and a fluctuating AC component, the two conditions comprised of the DC component and a fluctuating AC component; and the gas sensor system further comprising a processing portion, the processing portion analyzing each of the DC component and a fluctuating AC component to determine gas concentrations in the flue gas.

Accordingly, claim 1 clearly recites that the invention of claim 1 is directed to a gas sensor system and that the gas sensor system includes a gas sensor and a processing portion. Further, particulars of the processing of the processing portion are recited, including processing of the DC component and a fluctuating AC component by the processing portion. It is respectfully submitted that the applied art fails to teach or suggest such particulars.

Reber is directed to an oxygen sensing probe of the type in which a sensor tip made of a solid electrolyte is secured within a supporting tube by an hermetic seal. Reber teaches that the tip is made of yttria-stabilized zirconia; the tube is made of magnesium-aluminate spinel, calcia and zirconia; and the tip and the tube are bonded together by a fusion weld consisting of a eutectic mixture of the tip material and the tube material. In column 2, lines 13-14, Reber describes that for purposes of illustration, the Reber invention is shown in the drawings as being incorporated in a probe 10 for measuring the oxygen content of a fluid. Reber teaches the probe may, for example, be used in connection with a heat treating furnace to measure the concentration of oxygen in the gaseous treatment atmosphere in the furnace; and that the probe also may be used to measure the oxygen content of a liquid such as molten copper.

Further, in column 3, lines 33-65, Reber teaches further aspects of the sensor tip. Reber teaches the sensor tip 11 which is preferred for use in the Reber invention is a tip sold by Autolite Division of Allied Automotive. Such a tip is formed of a ceramic material. Reber describes that a tip of this type is preferred since it is commercially available and thus relieves

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the manufacturer of the probe 10 from making a specially formulated component. Reber explains that it will be appreciated, however, that the tip could be made of other metal oxides. The sensor tip is hollow and the major portions of its inner and outer surfaces are coated with a high temperature and electrically conductive noble metal. Platinum is the preferred coating although, for certain tips, nickel or palladium could be used in place of platinum. Reber describes that the coating is electrically conductive and is capable of serving as an electrode as well as a catalyst promoting the ionization of oxygen.

It is respectfully submitted that Reber fails to teach or suggest the features as recited in amended claim 1. In the Office Action, Kimura is relied on for teachings relating to the application of a protective layer to a measuring electrode. The Office Action asserts that in turn, based on such modification of Reber, the claimed invention would have resulted. However, it is respectfully submitted that even if Reber was modified by the teachings of Kimura, as asserted in the Office Action, such modification of Reber would fail to teach or suggest the claimed invention as recited in amended claim 1.

Accordingly, Applicant respectfully submits that the applied art, either alone or in combination, fails to teach or suggest the invention as recited in claim 1. Further, Applicant respectfully submits that claim 31 recites patentable subject matter for reasons similar to those set forth above with respect to claim 1. Further, the various dependent claims recite patentable subject matter at least for their various dependency on claim 1, as well as for the additional subject matter such claims recite.

In particular, claim 26 (in conjunction with claim 25) recites wherein the DC component is analyzed by the processing portion to determine an O₂ concentration in the flue gas, and wherein the fluctuating AC component is analyzed by the processing portion to determine a

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parameter representing the concentration of combustibles in the flue gas. Neither Reber nor Kimura teach or suggest such claimed features, in particular in conjunction with the claimed structural arrangement of the gas sensor.

Accordingly, reconsideration of the rejection under 35 U.S.C. §103 and allowance of the rejected claims are respectfully requested.

C. The Further 35 U.S.C. § 103(a) Rejections

In the Office Action in paragraph 12, claims [10] 11, 13, 14, 19, 31 and 39 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Reber and Kimura and further in view of Yokota et al. (U.S. Patent No. 6,254,749 B1).¹ Further, claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reber, Kimura and Yokota as applied to claim 11 above, and further in view of Takahashi et al. (U.S. Patent No. 5,705,129). In the Office Action, claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reber and Kimura in view of Maeda et al. (U.S. Patent No. 4,430,192). Claims 31 and 39 are rejected over Reber, Kimura and Maeda (with or without the teaching of Yokota). Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reber and Kimura as applied to claim 1 above, and further in view of EP 0 120 423 A1. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reber, Kimura and Yokota (with or without Maeda) as applied to claim 31 above, and further in view of EP 0 120 423 A1.

¹ In a November 12, 2004 telephone conference with Examiner Olsen, the Examiner clarified that in paragraph 12 of the Office Action, "10" should be --11--. Accordingly, Applicant understands that claim 11 is rejected under the applied art to Reber, Kimura and Yokota.

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It is respectfully submitted that even if it were obvious to modify the teachings of Reber as asserted in the Office Action, which it is not, such modified invention of Reber would still fail to teach or suggest the particulars as discussed above with respect to claim 1.

For example, with respect to Yokota, the Office Action (with reference to the March 22, 2004 Office Action), asserts that Yokota teaches in an alternate gas sensor that two gases can be monitored simultaneously by providing two different electrodes on the outside of the solid electrolyte element so that oxygen and carbon monoxide can be simultaneously measured. The Office Action notes fig. 4 and col. 9, line 56 through col. 10, line 11 of Yokota. The Office Action asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Yokota for the sensor of Reber such that other gas components can be simultaneously monitored thereby increasing the utility of the sensor to other gas constituents.

However, even if Reber and Kimura were so modified by the teachings of Yokota, it is submitted that such modification would fail to teach or suggest the claimed invention. Specifically, the applied art fails to teach the specifics of the sensor, in conjunction with the claimed processing performed by the processing portion,, as recited in claims 1 and 31.

Accordingly, such further claims rejected under various grounds under 35 U.S.C. §103 are allowable at least by virtue of their dependency on independent claim 1 or 31, as well as for the additional limitations set forth therein.

D. Conclusion

In view of the foregoing amendments and arguments, Applicants respectfully submit that this application is now in condition for allowance. If the Examiner believes that prosecution and allowance of the application will be expedited through an interview, whether personal or

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telephonic, the Examiner is invited to telephone the undersigned with any suggestions leading to favorable disposition of the application.

Respectfully submitted,

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